



BREAKING THE
LINEAR MOULD

Getting the most out of LEDs



Chalmit

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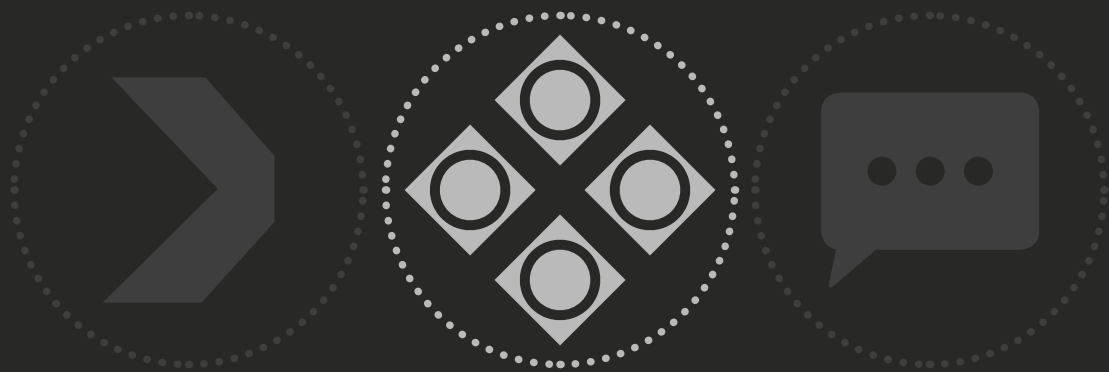
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BREAKING THE LINEAR MOULD



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BREAKING THE LINEAR MOULD

► Getting the Most out of LEDs

Lighting is more than just illumination for health and safety. Yes, you need light to see and safely operate at night, but lighting strategies require much more consideration and can have a major impact on a business' bottom line. In a time where businesses are continuously striving to be more environmentally friendly, the benefit of LED lighting can be immediate due to increasing efficiencies in the technology. LED luminaires require far less energy compared to fluorescent alternatives, but the "green" aspect of LED lighting is well documented.

For over 50 years, traditional 2ft and 4ft linear luminaires have dominated low level lighting applications in hazardous and industrial areas. The linear shape of the enclosures has been dictated by the length of the conventional fluorescent lamps they housed, i.e. 18W lamps in a 2ft linear, 36W lamps in a 4ft linear, and 58W lamps in a 5ft linear, where appropriate. That same shape is still commonly in use now, but why?

The most obvious answer is precedence – that's how a linear has always appeared, and by retrofitting some LEDs into a traditional enclosure, users will be able to reap all the benefits of LED, right? The truth is, they won't. Putting LEDs into a linear enclosure would be like installing a 4K touch screen on a Nokia 3310. It works, you now have a touchscreen, but the user experience pales in comparison to a model that's been designed around the screen.

The same can be said for LEDs. To get the most out of them, the LED array must be placed at the centre of the design, not installed within an old enclosure. Over the course of this whitepaper we'll discuss exactly why this is.

**“The benefit of LED lighting
can be immediate due to
increasing efficiencies.”**



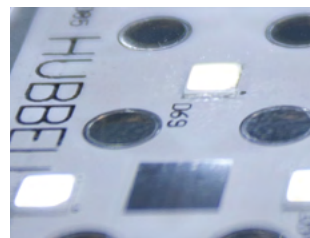
BREAKING THE LINEAR MOULD

► Optimising Lumen Output

Reducing the traditional linear form factor is one consideration, but that's impractical if you are unable to achieve an equivalent performance and distribution that users expect.

Due to the directional nature of LEDs, you cannot just compare delivered lumen outputs between products, as the same illumination level over a specific area could be achieved with a lower output product. Fluorescents have the advantage of a 360° tube of light but, coupled with a deep bowl diffuser, it is very difficult to control the distribution and keep light pollution to a minimum. A more focused output combined with impressive colour rendering will ease precision tasks such as quality checks and critical duties, i.e. essential shutdown or gauge measurements.

That's where careful consideration needs to be given to primary and secondary optics in the luminaire.



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In utilising specialised optics over the LED chips, it is possible to deliver the performance of a conventional linear fitting in a lightweight and slimline package. This is well established in LED luminaires for architectural and amenity applications so there is an extensive variety of optics available, each providing a distinct distribution to suit specific applications.

Some examples of possible lighting distributions are shown in Fig. 1, all achieved by using primary internal optics. The optics control the spread of light to generate a highly targeted bright, white output over the desired area, whilst limiting the amount of wasted spill light. A higher, more focused output can lead to fewer luminaires required on site, dramatically reducing installation and inspection times.

It's all about utilising the output as efficiently as possible - directing the light where you need it to go.

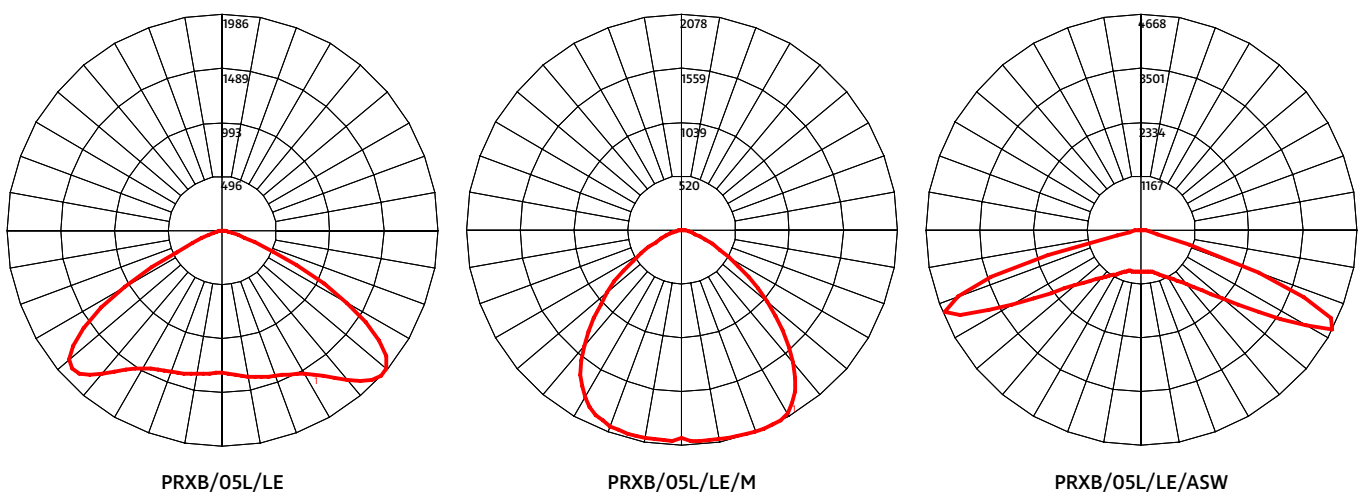


Fig 1:

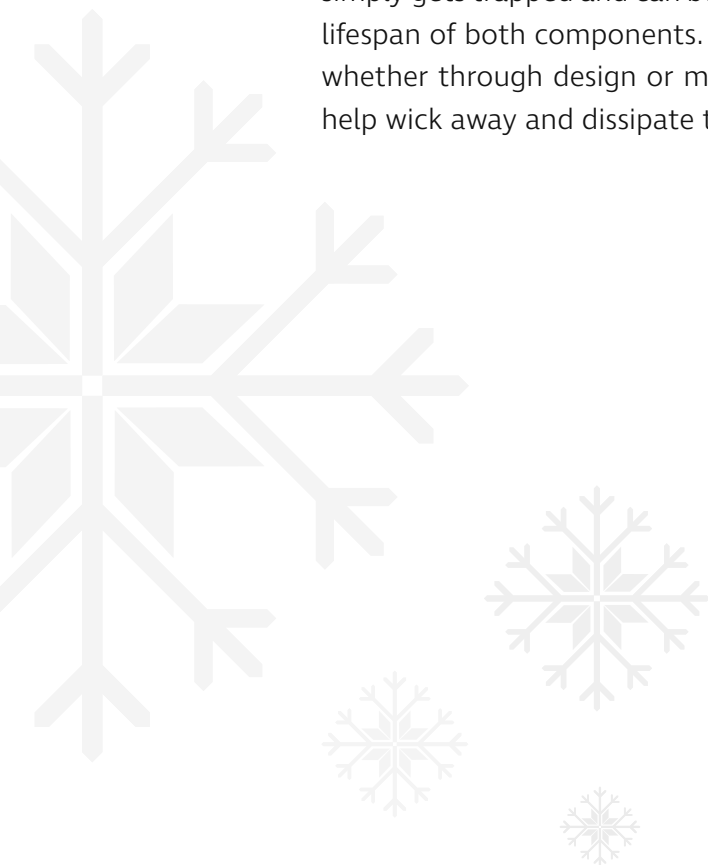
Examples of different lighting distributions achieved with Wide, Medium or Asymmetric optics in the Protecta X LED linear.

BREAKING THE LINEAR MOULD

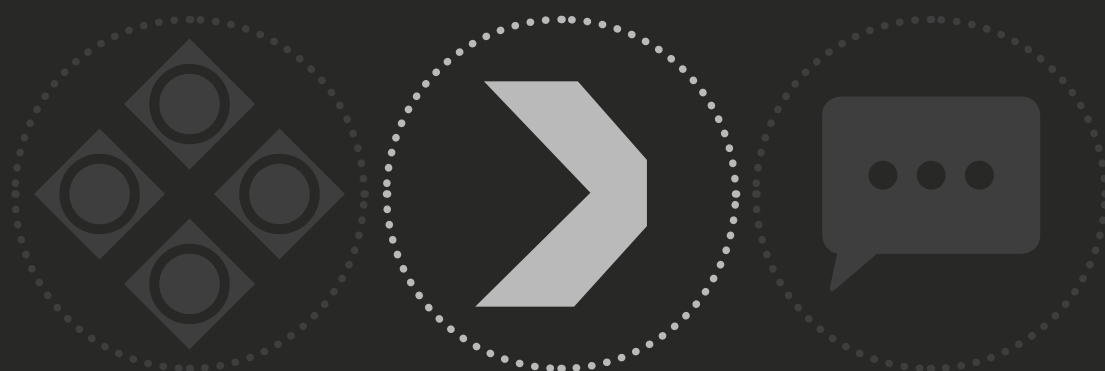
► Keeping it Cool

The key to longevity in any LED luminaire is temperature. Or more specifically, keeping the internal temperature rise to a minimum. LEDs thrive at low temperatures but do not like high temperatures, so the cooler the ambient they operate in, the more efficiently they will perform and the greater lifetime you will be able to achieve.

While long life fluorescent lamps exist (achieving in the region of 80,000hrs), traditional fluorescent lamps will have a lifetime of up to 20,000hrs. Projected LED L70 lifetimes in excess of 150,000 hours (17yrs+) at an ambient of 25°C are not uncommon from established LED manufacturers, so a more valuable metric is system life, i.e. the time to first component replacement. In the case of most non-emergency LED luminaires, this value is based on the expected lifespan of the driver. In a traditional GRP linear enclosure, the LEDs and driver are housed in the same body. The poor conductive properties of plastic means that the heat simply gets trapped and can build up internally, potentially shortening the lifespan of both components. Therefore, thermal management is critical, whether through design or material selection. Effective heat sinking will help wick away and dissipate the generated heat into the atmosphere.



THE PROTECTA X LED



- Introducing The Protecta X
- Specialised Optics
- Keeping the Temperature Down
- Putting the Customer at the Centre

THE PROTECTA X LED



➤ Introducing the Protecta X

Chalmit's largest ever investment in product development, the **Protecta X** is the result of hundreds of hours of study with customers, multiple designs and countless prototypes. Focusing on the benefits of LED technology and how they could be impacted through installation in a traditional linear enclosure, the Chalmit design team sought to optimise LED performance in two main ways. Firstly, by **improving photometric performance** and secondly, by **extending the luminaire lifespan**.



**"The Protecta X is Chalmit's
largest ever investment in
product development"**



THE PROTECTA X LED

► Specialised Optics

In utilising specialised high efficiency optics over the LED chips, the **Protecta X** can deliver the performance of a 4ft linear with significantly improved efficacy (lm/W), all in a slimline luminaire package.

There is a selection of optics available for the **Protecta X**, each providing a distinct distribution, and allowing the product to be optically optimised in a variety of typical site applications, from handrails to lowbay, whilst keeping undesirable light pollution to a minimum. The lighting calculations in Fig. 2 provide a comparison between Chalmit's Protecta III and Protecta X linears mounted at 2.4m on a swan neck style bracket, with 15° tilt. To achieve a typical average illumination of 100lx along a 1m wide walkway, you can utilise a 5.8m spacing with the Protecta III fluorescent (PRGE/236/BI), 6.4m spacing with the Protecta III LED (PRGE/05L/LE) or 8m spacing with the Protecta X LED (PRXB/05L/LE/ASW). For a sample 100m long walkway, this equates to either 18x PRGE/236/BI, 16x PRGE/05L/LE or 13 x PRXB/05L/LE. Potentially reducing the linear quantity by a quarter!

However, its not just about the number of products - fewer luminaires will require fewer cable glands, fewer junction boxes, and a significant reduction in energy consumption. Savings that cannot be overlooked.

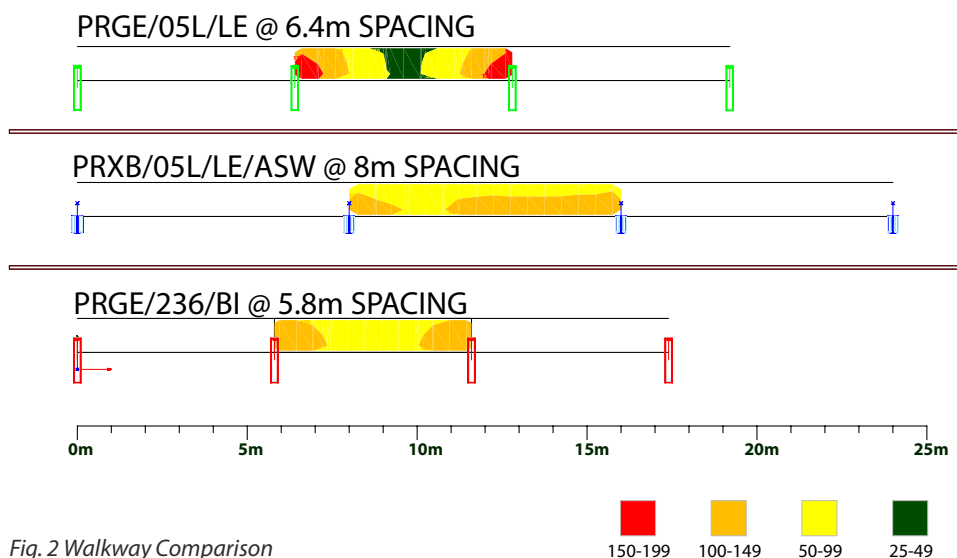


Fig. 2 Walkway Comparison

THE PROTECTA X LED

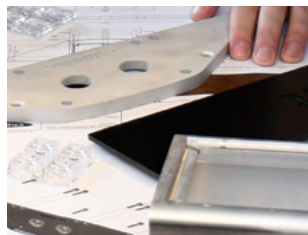
➤ Keeping Temperatures Down

A major part of the design concept for the **Protecta X** was to separate the driver and LED enclosures, allowing a flow of air to efficiently dissipate the heat generated. This limits internal temperature rise and ensures that the luminaire meets its stipulated lifespan.

In the field, the collection of dust and particulates around the enclosure can trap heat. Chalmits' new luminaire has been designed with small air gaps between the wings and central body to prevent this, allowing for water run-off to wash away any build up and keeping the thermals as low as possible. With all that in mind, the **Protecta X**'s long-life Cree LEDs have a minimum expected lifespan of 200,000 hours, whereas the driver will achieve 90,000 hours at the maximum rated ambient of 60°C. At a more realistic average ambient of 25°C, the product system life will increase to 120,000 hours.

The **Protecta X**'s enclosure material also contributes to thermal management. The highly recyclable marine grade aluminium construction ensures that heat has a direct route from inside the enclosure to the outside via an efficient conductor.

Additionally, the aluminium helps contribute to the product's exceptional ambient temperature range of -40°C to +60°C in standard models and -25°C to +60°C in the emergency variants.



"The Chalmit team carried out an extensive Voice of the Customer survey"



THE PROTECTA X LED

► Putting the Customer at the Centre

Before developing any new product, voice of the customer feedback is essential in ensuring that the customer “wants” are captured and identified, which usually arise from historical issues experienced. In the case of the **Protecta X**, the Chalmit team carried out an extensive voice of the customer survey, obtaining two key pieces of feedback.

The first of these was related to battery maintenance on integral battery-backed Emergency products. Often a luminaire is ordered and delivered to site well in advance of the project completion. These luminaires are either installed and commissioned before disconnecting power, or left uninstalled in a warehouse for a long period of time before they are required.

In both these cases, the longer you leave the battery unpowered in an Emergency luminaire, the more likely it could fall into an unrecoverable deep discharge state and will need to be replaced. The Emergency **Protecta X** is powered by an innovative ‘**hot swappable**’ battery stick which can be externally accessed and easily slotted in and out of the side of the luminaire, even after it has been installed on site. Emergency fluorescent linears traditionally require isolation of power before opening the diffuser to access the battery for maintenance, so the benefit of a ‘hot swappable’ solution means that the battery can be replaced while the luminaire is still energised, and without needing to open the driver enclosure.

This hot swappable battery means that **Protecta X** users can buy an Emergency version and, if they encounter any discharge issues with the batteries, they can remove or replace the stick in a matter of seconds. They even have the option to order the battery stick at a later date when they’re ready to commission the luminaire, ensuring that they don’t have to purchase it twice!

THE PROTECTA X LED

▶ Putting the Customer at the Centre

Reducing installation time was also the motivation behind the second piece of customer feedback. The installation of cable and glands in linear luminaires often requires customers to remove everything out of the Enclosure, including the LED array and driver typically mounted on an internal geartray, to install wiring. The **Protecta X** allows you to terminate your cable and glands via a front access panel. This means there's no need to take the Enclosure apart – just take off the front panel, wire and go!

These features and more, make the ATEX and IECEx certified **Protecta X** ideal for any hazardous and industrial applications.



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ABOUT CHALMIT

In 2005, using our century's worth of experience designing luminaires for hazardous areas, Chalmit introduced the world's first Zone 1 LED luminaire: the NexLED. Since then, we've expanded our range to ensure that our customers can benefit from the energy efficiency and cost savings that LED can deliver.

We're now proud to offer the most complete range of LED luminaires on the market. With an offering including; linear, flood, bulkhead and recessed lighting, find the right products for the exacting demands of the worlds most harsh and hazardous environments with Chalmit.

Chalmit is part of the Hubbell Harsh & Hazardous group of companies.

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